SOME NORTH AMERICAN GENERA OF THE DIPTEROUS GROUP, CALLIPHORINAE GIRSCHNER.

By Garry de N. Hough, M. D.

The masterly researches of Herr Ernst Girschner have thrown a flood of light upon the Cimmerian darkness of the classification of the Muscidæ. One of the groups clearly established by him is that of the Calliphorinæ, the North American genera of which form the subject of this paper.

The super-family Muscidæ is thus defined by Prof. Williston:

Proboscis functional or rudimentary. In the former case usually short and with pseudotracheate labellæ, but sometimes elongate and adapted for piercing; palpi sometimes rudimentary, never jointed. Antennæ always three-jointed, the third joint simple, round, oval or elongate, compressed and always (except in *Cryptochaetum*, where it is entirely absent), with a bare, pubescent or plumose, dorsal or subapical arista. Auxiliary vein sometimes rudimentary, often more or less coalescent with the first longitudinal vein, usually distinct in its entire course; never more than one submarginal and three posterior cells present: the submarginal and marginal cells always open: basal cells never large, the second basal sometimes coalescent with the discal cell, the anal cell present or absent; posterior cross vein rarely absent. Pulvilli always present; empodia wanting; claws of the male often larger than those of the female.

For over sixty years dipterologists have divided the Muscidæ into two great series: Calyptratæ and Acalyptratæ. In general there is no difficulty in determining to which series a given form belongs, but to this rule there are exceptions. Girschner's definitions seem better than any others known to me. They are as follows:

Acalyptratæ.—Squamula alaris always distinctly developed, but never very large; squamula thoracalis usually lacking, at most present as an insignificant widening of the frenum squamulare. Posthumeral and intraalar macrochætæ not simultaneously present. Thorax usually without a complete transverse suture. Postalar callus absent. Hypopleural macrochætæ absent.

Calyptratæ.—Squamula alaris always distinctly developed; squamula thoracalis very variable in size, in the higher forms larger than the squamula alaris, often very much larger. Both posthumera and intraalar macrochætæ present. Thorax with a complete transverse suture. Postalar callus present and separated by a distinct suture from the dorsum of the thorax. Hypopleural macrochætæ present or absent.

Even these definitions, as Girschner has pointed out, are

not absolute, certain forms, especially among the Scatomyzidæ and Sapromyzidæ, being by the definition, Calyptratæ, while other very closely allied species are, by the definition, Acalyptratæ. Both these families are considered as families of the acalyptrate series by the best authorities.

Girschner separates the Calyptratæ into two grand divisions: Anthomyidæ and Tachinidæ, which are by no means identical with the families usually understood by those names.

Anthomyidæ.—Hypopleural macrochætæ absent. If three sternopleural macrochætæ are present their arrangement is always 1:2. Elbow (if any) of the fourth longitudinal vein without appendix. Ventral membrane usually present. Development of the squamula thoracalis very variable.

Tachinidæ.—Hypopleural macrochætæ present. If three sternopleural macrochætæ are present their arrangement is always 2:1 or 1:1:1. Fourth longitudinal vein almost always with an elbow, which frequently has an appendix. Ventral membrane usually not present. Squamula thoracalis always well developed, larger than the squamula alaris, sometimes very large.

Girschner splits up his Tachinidæ into nine groups, one of which is the Calliphorinæ, which may be thus defined:

Calliphorinæ.—Hypopleural bristles present. Ventral membrane very rarely visible. Second ventral segment, in both sexes, lying with its edges upon and covering the edges of the corresponding dorsal segment, the other ventral segments lying free, at any rate in the male. Fifth ventral segment of the male frequently greatly developed, with its caudal border incised to a point beyond the middle. Usually only two posterior intraalar bristles. Color very frequently metallic. Arista, as a rule, long, plumose. Stigmata sometimes very large. Front of the male narrowed (eyes sometimes in contact), that of the female wide.

The following American genera belong to this group: *Pollenia*, *Compsomyia*, *Mesembrinella*, *Cynomia*, *Calliphora*, *Lucilia*, *Phormia* and *Protocalliphora*. It is quite probable that the Mexican genera, *Tyrcomma* and *Chloroprocta*, also belong here, but of these I have as yet seen no specimens, and Mr. van der Wulp's descriptions do not permit undoubted conclusions to be drawn in the matter.

Pollenia and *Compsomyia* differ from the other genera of the group in having the vibrissal angle some distance dorsad of the edge of the mouth opening. *Pollenia* has the thorax thickly beset with fine, soft, woolly hair in addition to the macrochætæ. Fresh specimens show this very well, but if

the specimen is somewhat worn the woolly hair can often only be seen on the mesopleura or on the pteropleura beneath the wing. *Compsomyia* has no woolly hair and the dorsum of the thorax is distinctly striped. For this latter genus the name *Chrysomyia*, proposed by Desvoidy in 1830, should have priority over Compsomyia. Of *Pollenia* I have seen but one North American species, *P. rudis* Fabr. Of *Chrysomyia* I have two species, the common *C. macellaria* Fabr. and an undescribed species from California.

Mesembrinella may be distinguished by the following characters: Elbow of fourth longitudinal vein not angular, but forming a gentle curve much as Graphomyia, the apical cross vein convex outwardly. The third longitudinal vein either without spines or with a very few at the extreme base. Genæ naked.

Cynomia is a genus for which I find structural characters in the male sex only. The arista is usually plumose for not more than two-thirds its length. The hypopygium is very prominent; the apex of the abdomen ends with a pair of large, slightly curved, pointed processes, which are directed cephalad along the ventral surface of the abdomen, and usually more or less concealed by the fifth ventral segment; this fifth ventral segment is split in the median line from its caudal border about half way to its cephalic border. The female presents the most striking likeness to female Calliphoræ. Neither the shape of the head, the extent of plumosity of the arista, nor the chætotaxy being invariably such as to enable the separation to be made. It is true that an anterior intraalar, or a third posterior achrostical macrochæta, is rarely present, but their presence, though rare, is a bar to making their absence a generic character. I have found myself obliged to rely upon the rather more elongate form of *Cynomia* and still more upon the pure metallic color of the abdomen, which is almost absolutely free from pollinose coating (except in *C. elongata* Hough), to distinguish female Cynomyiæ from Calliphoræ.

Of *Cynomia* I know four species: *mortuorum* L. *americana* Hough, *elongata* Hough and *hirta* Hough.

The genera *Calliphora*, *Lucilia* and *Phormia*, established by

Robineau-Desvoidy in 1830, have not been accepted by all subsequent writers on diptera.

Macquart in 1834-1835 accepted *Calliphora* and *Lucilia*; Meigen in 1838 accepted *Lucilia*: Zetterstedt in 1845-1849 and 1859 agreed with Meigen. Rondani in 1856 and 1862, finding no characters on which to separate them, puts all three in one genus, *Mya* or *Somomya*. Schiner in 1862 recognizes *Calliphora* and *Lucilia* and includes *Phormia* in the latter. Finally at the present time Prof. Brauer accepts *Calliphora* and *Lucilia*, but does not mention *Phormia*.

The fact is that a satisfactory characterization of these genera is very difficult. Still, I believe that it can be found in the arrangement of characteristic macro- and micro- chætæ of the genæ, thorax and third longitudinal vein of the wing. To these characters I would add the form of that part of the thorax which is caudad the transverse suture. To complete the satisfactory distribution into genera of all the species of this group known to me I must establish a fourth genus, which I propose to call *Protocalliphora* for the two species *Musca azurea* Fall. and *Musca chrysorrhœa* Meig.

I consider *Phormia* and *Protocalliphora* as less highly developed, more primitive, than *Lucilia* and *Calliphora*, because they combine characters of the latter and because their chætotaxy is less regular, more variable and the individual macrochætæ are frequently less well developed. The two former have the thorax caudad the transverse suture distinctly flattened, while in *Lucilia* and *Calliphora* no such flattening exists.

In *Lucilia* and *Calliphora* the number of dorsocentral and achrostical bristles caudad the suture is unvarying for any species, and each individual macrochæta is well developed. In all the species that I have seen these dorsocentrals number three and these achrosticals either two or three.

In *Phormia* and *Protocalliphora* the posterior dorsocentrals, and achrosticals, one or both, vary in number or are poorly developed.

Calliphora.—Type *C. vomitoria* L. thorax not flattened, caudad the transverse suture. In any species the number of posterior dorsocentrals and achrosticals is constant, and both series consist of well developed macrochætæ. The genæ seen with an amplification of twenty diameters are distinctly hairy. The third longitudinal

vein has spines at its base only. The dorsal surface of the squamula thoracalis is hairy.

The species known to me which belong here are: *vomitoria* L., *erythrocephala* Meig., *violacea* Meig., *anthracina* Meig., *latifrons* nov. sp. and *nigribucca* nov. sp., which is, perhaps, only a variety of *erythrocephala*.

Lucilia.—Type L., *cæsar* L. Thorax not flattened caudad the transverse suture. In any species the number of posterior dorsocentrals and achrosticals is constant and both series consist of well developed macrochætæ. The genæ seen with an amplification of twenty diameters are absolutely naked. The spines of the third longitudinal vein are not limited to the extreme base, but extend well along the vein toward the small cross vein, say from two fifths to three quarters of that distance. The dorsal surface of both squamulæ is bare.

The species of *Lucilia* known to me are: *cæsar* L., *sericata* Meig., *nobilis* Meig., *sylvarum* Meig. and *spinicosta* Hough.

Phormia—Type *Phormia regina* Meig. Thorax somewhat flattened caudad the transverse suture. In any species the number of posterior dorsocentrals and achrosticals is inconstant; moreover, the macrochætæ of each series are not equally well developed, the most caudad being much the largest, and each succeeding one, as we pass cephalad along the series, being usually smaller until the last one or two are so small as to be distinguishable with difficulty or not at all from the surrounding microchætæ. The genæ seen with an amplification of twenty diameters are distinctly hairy. The spines of the third longitudinal vein are not limited to the extreme base, but extend, roughly speaking, half way to the small cross vein. The dorsal surface of the squamula thoracalis is bare.

The species of *Phormia* known to me are: *regina* Meig. and *grandadica* Zett.

Protocalliphora.—Type *P. azurea* Fall. Thorax somewhat flattened caudad the transverse suture. The number of posterior dorsocentrals is fairly constant, though not so absolutely invariable in a species as in *Lucilia* and *Calliphora*; each macrochætæ of the series is well developed and all are of about the same size. The posterior achrosticals are less well developed than the dorsocentrals, are variable in number in the same species and even on the two sides of the same specimen; in any specimen they may vary in size, these farthest cephalad being smallest. The genæ seen with an amplification of twenty diameters are distinctly hairy, the hairs being much coarser than in *Phormia* or *Calliphora*. The spines of the third longitudinal vein are not limited to the extreme base, but extend about half way to the small cross vein. The dorsal surface of both squamulæ is bare.

I am acquainted with two species of this genus: *azurea* Fall. and *chrysorrhœa* Meig.